CLAIMS

1. An electrical machine (1) comprising a stator (2) and a rotor, with a gap defined between the stator and the rotor, the machine further comprising;

coolant supply duct means (22) and coolant exhaust duct means (26),

a plurality of substantially radially extending coolant passageways (15) provided in a laminated core section (3) of at least one of the stator and the rotor, the coolant passageways (15) being defined between axially spaced stacks of laminations (4) in the laminated core section, the coolant passageways (15) being connected to the coolant supply duct means (22) through the gap between the stator and the rotor, and

a matrix of coolant duct sections (5) extending circumferentially and axially of the laminated core section (3), a plurality of adjacent coolant duct sections (5) being in fluid communication (11) with each other transverse of the radial direction to transfer coolant in predetermined paths within the coolant duct matrix, the matrix having first and second radially spaced apart faces, the first face being in fluid communication with the radially extending coolant passageways (15) in the laminated core section, characterised in that the second face is in fluid communication with the coolant exhaust duct means (26), such that selected of the coolant duct sections (5) communicate directly with the coolant exhaust duct means (26) through the second face of the matrix.

2. An electrical machine according to claim 1, in which the first and second radially spaced apart faces of the matrix of coolant duct sections (5) comprises its radially inner and outer faces respectively.

3. An electrical machine according to any preceding claim, in which the matrix of coolant duct sections (5) is defined between a plurality of annular side walls (9) which extend radially and circumferentially of the laminated

core section (3) and a plurality of end walls (10) which extend radially and axially of the laminated core section.

4. An electrical machine according to claim 3, in which apertures (11,12) are provided in selected of the side walls (9) and end walls (10) of the coolant duct sections to facilitate the transfer of coolant in the predetermined paths within the coolant duct matrix.

5. An electrical machine according to claim 4, in which the size and number of the apertures (11,12) are selected to achieve desired axial and circumferential pressure differences within the matrix of coolant duct sections (5).

6. An electrical machine according to claim 4 or claim 5, in which each side wall and each end wall has a respective aperture.

7. An electrical machine according to any one of claims 3 to 6, in which a side wall at each axial end of the matrix constitutes an end plate of the laminated core section.

8. An electrical machine according to any one of claims 3 to 7, in which the end walls are equi-angularly spaced around the laminated core section.

9. An electrical machine according to any preceding claim, in which each coolant duct section communicates directly with a plurality of the radially extending coolant passageways through the first face of the matrix.

10. An electrical machine according to any preceding claim, in which the coolant supply duct means defines a coolant supply path directed towards an axial end of the laminated core section through a plenum chamber axially adjacent the laminated core section, the gap between the rotor and the stator communicating with the plenum chamber to provide a coolant flow path

from the plenum chamber to the radially extending coolant passageways in the laminated core section.

11. An electrical machine according to claim 10, in which the coolant supply duct means defines coolant supply paths directed towards both axial ends of the laminated core section through respective plenum chambers.

12. An electrical machine according to claims 10 or 11 as dependent on claim 7, in which apertures in at least one of the end plates of the laminated core section provide a coolant flow path from the plenum chamber to selected of the coolant duct sections in the matrix.

13. An electrical machine according to any preceding claim, in which at least one of the coolant supply duct means and the coolant exhaust duct means extends radially of the machine.

14. An electrical machine according to any preceding claim, in which the plurality of substantially radially extending coolant passageways provided in the laminated core section comprise axially thin annular ducts.

15. An electrical machine according to claim 14, in which the axially thin annular ducts are defined by spacer means provided between adjacent confronting stacks of laminations in the laminated core section.

16. An electrical machine according to claim 15, in which the spacer means comprise a pattern of mutually spaced apart axially projecting generally cylindrical members attached to at least one of the confronting laminations, the pattern extending between radially inner and outer peripheries of the confronting laminations.

17. An electrical machine according to claim 16, in which the pattern of generally cylindrical members extends throughout the total annular extent of the passageway.

18. An electrical machine according to any preceding claim in which the matrix extends around the entire circumference of the laminated core section.

19. An electrical machine according to any preceding claim in which the coolant duct sections which communicate directly with the exhaust duct means comprise approximately half the circumferential extent of the matrix.

20. An electrical machine according to any preceding claim comprising a propulsion unit for a ship in which the machine is located within a bulbous portion extending from a hull of the ship, the rotor of the machine being located on a propeller shaft which extends outside the bulbous portion for propulsion of the ship, the coolant supply duct means and the coolant exhaust duct means being arranged within the bulbous portion to supply and exhaust coolant through the ship's hull.